

layout for keys in touchpad 24B is a standard QWERTY keyboard layout. One variant of a QWERTY layout is to present a layout of keys in lower case, as “qwerty” characters. An alternative QWERTY layout is to present a layout of keys in uppercase, as “QWERTY” characters. Other layouts include a layout for numeric keys or a layout for non-English language character sets (e.g. Japanese, French, Korean, Danish, and others).

[0065] Backlight system 64 may assist with viewing elements in display 14 in low light conditions.

[0066] Database 72 is provided to store data and records for applications 48 and other modules and processes. Database 72 may be provided in flash memory 42 or in another data storage element.

[0067] With some aspects of device 10 described above, further detail is now provided on notable aspects of an embodiment. In particular, an embodiment provides a system and method for providing tactile feedback to a user as the user provides a user action to an input device in device 10. In an embodiment the input device may be touchpad 24B.

[0068] Touchpad 24B may have one or more input regions covered by a surface. When a user glides his finger over an input region, an input signal may be generated by touchpad 24B and/or input signal generator 74. An embodiment provides a physical feature associated with an input region on the surface of the input device. The physical feature provides a tactile feedback to a user of the input device distinguishing the input first region in the surface from other regions on the surface of the input device. In one embodiment the physical feature is mounted or built into touchpad 24B. The feature may be a raised bump, ridge, platform, cover, depression, dimple etc. The feature may be a change in the texture of the surface of touchpad 24B such as a crosshatch of fibres or the like, on touchpad 24B. The feature may be incorporated as part of a raised section and/or a well or depression in the surface of touchpad 24B. The feature may be built on top of sensors in the touchpad circuit and/or may be placed underneath a substrate of touchpad 24B. The feature may be electrically neutral in resistance and/or capacitance to the user action. Alternatively the user action on the feature may generate a specific electrical signal from a circuit associated with the touchpad 24B.

[0069] The physical feature, in one embodiment, provides a tactile feedback to the user when touchpad 24B is being scanned by his finger (or other part of his person). If the physical feature alone is contacted by the user's finger, touchpad 24B may not register a signal, or may register one type of signal. There may be a preset mapping of feedback senses relating to the detected user action. If the first type of signal is registered for an input device, then in the mapping, it may be assumed that a user's finger is hovering about the input device. As such, the user would recognize the feedback generated, and know that his finger is currently positioned about a specific key in touchpad 24B. If he wishes to activate that key, he would depress that area of touchpad 24B further to initiate an “activate” signal for that key in touchpad 24B. As the user's finger presses further on the feature, a part of his finger will eventually contact touchpad 24B. At that instance, the contact is detected by touchpad 24B (either through a second level of signal that is distinguished from the above signal or a different signal). Also, as a user glides a finger across the surface of touchpad 24B, it will run into the feature and run over it. There may or may not be a disruption in the signals (or progression of signals) generated by touchpad 24B

and/or input signal generator 74 as this glide occurs. The gliding of the finger over the features on touchpad 24B may be a separate user action. There may be one or more time boundaries defined for the gliding action. For example, the entire glide may be required to cover a certain area on touchpad 24B within a predefined time limit (e.g. less than any of 30, 20, 10, 5, 2, or 1 second). Additionally or alternatively, the traversal of the feature may be required to be completed within another predefined time limit (e.g. less than any of 3, 2, 1, 0.5, 0.25, or 0.1 second). Such data may be processed by input signal processing application 48G to make a determination when a when a gliding action does or does not match a predetermined input signature for a predetermined user action that requires further activity by device 10.

[0070] The input signal generator 74 (and/or input signal processing application 48G) may process the signals to address noise, temperature, humidity, electrostatic discharge (ESD) compensation, and other operating parameters relevant to touchpad sensing technologies and hysteresis for detection between the different input regions. As previously noted, a finger resting/moving on touchpad 24B would have a higher capacitance value, then as it approaches the feature, one would see a drop in value (as the feature is mounted and the air gap is created between the feature and the surface of the touchpad). Next, when the finger is on top of the feature and the user begins pressing down on it, the capacitance value would increase again as the user pushes on it. For example with an exemplary Synaptics clearpad (trade-mark), the Z (coverage value) may generate an output value of about 50 units. In such an arrangement, any reading above about 25 units would be designated to be a finger contact on touchpad 24B; any reading about below 25 units would indicate that a finger is in proximity of the touchpad surface, but not actually touching it. For example, as a finger moves along the touchpad surface, the readings would about 25 units or more and would drop below about 25 units as the finger goes on top of the nodule. When the finger pushes on the nodule, the readings may increase, for example to a value of about 40 units. These values have been observed to be generated from an ASIC of Synaptics touchpad—a conversion value may be ascertained to provide corresponding values in capacitance, inductance, resistance and/or reluctance. Generally, it has been observed that a weaker (namely smaller) capacitance reading is generated when a finger presses over the nodule as opposed to a finger pressing on a surface of the touchpad, as when the finger is pressing on the nodule, there is only have partial contact of the finger with the touchpad. From monitoring the coordinates of the input signals, the embodiment can also determine the co-ordinates of the finger travel on touchpad 24B and determine when a finger has “stopped” at a location thereon. At that time, the input signal processing application 48G may be placed in a mode to expect or wait for a finger to depress at the stopped location, indicating to register a finger for a given feature and/or function launch.

[0071] With this tactile feedback, a user may scan his finger across touchpad 24B without having to necessarily look at touchpad 24B to determine what keys are being scanned. The user, through learning, may associate specific features with specific keys. Once he feels a target key in touchpad 24B, he can stop scanning and then press harder on the feature to activate it.

[0072] Now, further detail is provided on an exemplary input device according to an embodiment. Referring to FIG. 3, a portion of touchpad 24B is shown at 300. Keys in touch-